

## 2.1 Practice A

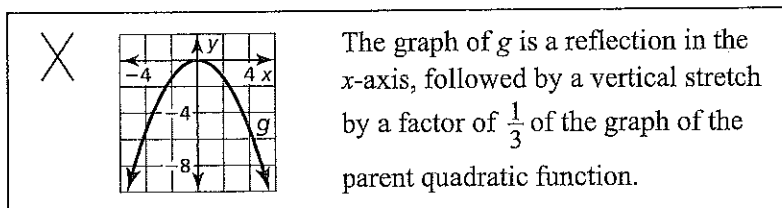
In Exercises 1–6, describe the transformation of  $f(x) = x^2$  represented by  $g$ .

Then graph each function.

1.  $g(x) = x^2 - 2$
2.  $g(x) = x^2 + 1$
3.  $g(x) = (x + 1)^2$
4.  $g(x) = (x - 2)^2$
5.  $g(x) = (x - 5)^2$
6.  $g(x) = (x + 2)^2 - 1$

In Exercises 7–9, describe the transformation of  $f(x) = x^2$  represented by  $g$ . Then graph each function.

7.  $g(x) = -2x^2$
8.  $g(x) = (-2x)^2$
9.  $g(x) = \frac{1}{4}x^2$
10. Describe and correct the error in analyzing the graph of  $f(x) = -\frac{1}{3}x^2$ .



In Exercises 11 and 12, describe the transformation of the graph of the parent quadratic function. Then identify the vertex.

11.  $f(x) = 2(x + 3)^2 + 2$
12.  $f(x) = -5x^2 - 1$

In Exercises 13 and 14, write a rule for  $g$  described by the transformations of the graph of  $f$ . Then identify the vertex.

13.  $f(x) = x^2$ ; vertical stretch by a factor of 3 and a reflection in the  $x$ -axis, followed by a translation 3 units down
14.  $f(x) = 4x^2 + 5$ ; horizontal stretch by a factor of 2 and a translation 2 units up, followed by a reflection in the  $x$ -axis
15. Let the graph of  $g$  be a translation 4 units down and 3 units right, followed by a horizontal shrink by a factor of  $\frac{1}{2}$  of the graph of  $f(x) = x^2$ .
  - a. Identify the values of  $a$ ,  $h$ , and  $k$ . Write the transformed function in vertex form.
  - b. Suppose the horizontal shrink was performed first, followed by the translations. Identify the values of  $a$ ,  $h$ , and  $k$ , and write the transformed function in vertex form.

**2.1 Practice B**

In Exercises 1–6, describe the transformation of  $f(x) = x^2$  represented by  $g$ .

Then graph each function.

1.  $g(x) = x^2 + 3$

2.  $g(x) = (x + 5)^2$

3.  $g(x) = (x + 6)^2 - 4$

4.  $g(x) = (x - 1)^2 + 5$

5.  $g(x) = (x - 4)^2 + 3$

6.  $g(x) = (x + 8)^2 - 2$

In Exercises 7–9, describe the transformation of  $f(x) = x^2$  represented by  $g$ .

Then graph each function.

7.  $g(x) = -\left(\frac{1}{2}x\right)^2$

8.  $g(x) = \frac{1}{3}x^2 + 2$

9.  $g(x) = \frac{1}{3}(x + 1)^2$

In Exercises 10 and 11, describe the transformation of the graph of the parent quadratic function. Then identify the vertex.

10.  $f(x) = -3(x + 6)^2 - 4$

11.  $f(x) = \frac{1}{3}(x - 2)^2 + 1$

In Exercises 12 and 13, write a rule for  $g$  described by the transformations of the graph of  $f$ . Then identify the vertex.

12.  $f(x) = x^2$ ; vertical shrink by a factor of  $\frac{1}{2}$  and a reflection in the  $y$ -axis,  
followed by a translation 2 units left

13.  $f(x) = (x + 4)^2 + 2$ ; horizontal shrink by a factor of  $\frac{1}{3}$  and a translation  
2 units up, followed by a reflection in the  $x$ -axis

14. Justify each step in writing a function  $g$  based on the transformations of  
 $f(x) = 4x^2 - 3x$ .

translation 3 units up followed by a reflection in the  $y$ -axis

$h(x) = f(x) + 3$	
$= 4x^2 - 3x + 3$	
$g(x) = h(-x)$	
$= 4x^2 + 3x + 3$	